March 30, 1948. S. J. POWERS 2,438,519

TUBULAR ELECTRODE ASSEMBLY SUPPORT FOR VACUUM TUBES

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FIG. 1.

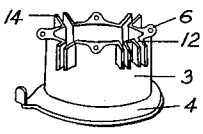
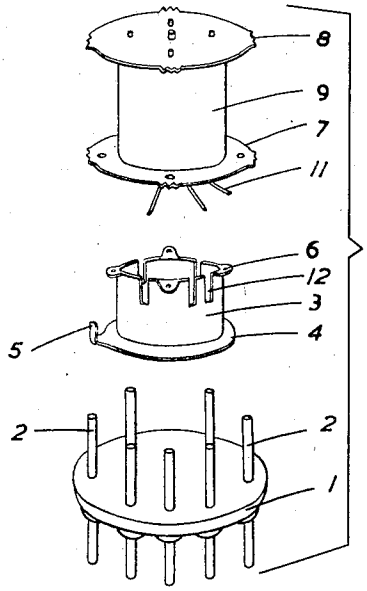


FIG. 4.



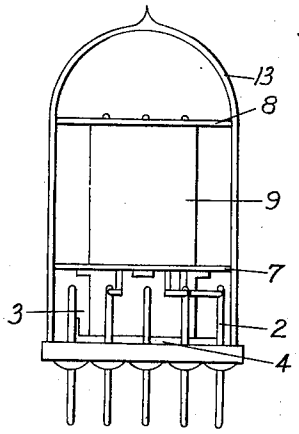
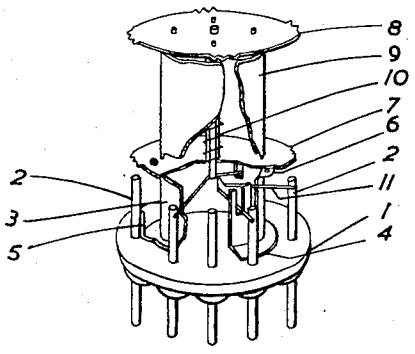


FIG. 3.

FIG. 2.



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TUBULAR ELECTRODE ASSEMBLY SUPPORT FOR VACUUM TUBES

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8 Claims. (Cl. 250—27.5)

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This invention relates to improvements in electron discharge devices of the vacuum or gas-filled types and is more particularly concerned with the manufacture of so-called miniature valves employing button stems.

One conventional tube has a bulb closed with a glass disc or header in which is sealed several lead wires, the outer ends of which serve as the base.

Usually these heavy pins are joined to lighter leads, of the same or different materials, which are extended into the vacuum envelope, to facilitate bending and attachment to the electrodes.

This necessary flexibility often works against the use of these wires as mechanical support and the random bending necessary to afford mechanical support often brings the wires into close proximity with each other necessitating the use of shielding plates.

The principal object of the present invention is to avoid the above-mentioned difficulties and this object is achieved according to the invention by independently supporting the electrode assembly of the valve inside the envelope on a support member or sleeve of generally tubular form fixed to or integral with the header inside the circle of terminal pins, which are respectively connected to the electrodes by separate conductors.

In one embodiment of the invention the support member, which is preferably constructed of metal, is provided with flanges at its upper and lower ends, and is so dimensioned that it can be fitted coaxially inside the circle of the terminal pins without touching them. The lower flange may be extended radially along a sector of about 10° to form a lug which is bent back parallel to the axis of the tube. This lug is then welded to one of the terminal pins through which it may be connected to ground, for example. Such a sleeve for a miniature valve may be perhaps ¼ inch high.

Th upper flange of the sleeve incorporates holes, of an appropriate size, in a circle of the same diameter as the base pins. Additional holes are pierced in the mica disc and in the upper flange for the purpose of eyeletting the mica disc to the flange. The valve electrodes are then assembled with the mica disc, the electrodes extending through the first set of holes mentioned above. After completion the mica disc is eycletted to the upper flange at the second set of holes and the lug on the lower flange mentioned is then welded to the selected base pin wire and the

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electrode connections made by welding each to its corresponding pin.

A slightly different arrangement illustrated in the accompanying drawing is however preferable.

Fig. 1 shows an exploded view of the parts of a miniature valve with button stem, according to the invention; and

Fig. 2 shows the manner in which the parts are assembled together, some of the elements being cut away to show the arrangement clearly.

Fig. 3 shows an elevation view of the valve enclosed in an envelope.

Fig. 4 shows a modification of a part of the structure shown in Fig. 1.

A glass button or header 1 is provided with a number of straight rod or wire terminal pins 2 sealed through the header and arranged in a circle. The above mentioned metal sleeve 3 has a lower flange 4 provided with a lug 5, which as shown in Fig. 2 is welded or otherwise secured to one of the terminal pins 2. The upper end of the sleeve 3 is provided with four projecting lugs 6 through each of which is punched a fixing hole. These four lugs correspond to the upper flange in the arrangement previously mentioned. A lower mica disc spacer 7 is eyeletted to these fixing holes, and an upper mica disc spacer 8 co-operates with the spacer 7 for supporting and spacing the electrodes of the valve, such as the anode 9 and cathode 10. Appropriate connector tabs 11 are welded or otherwise secured to the electrodes. A number of longitudinal slots 12 are cut in the sleeve 3 to allow the tabs 11 to pass outside for welding to corresponding terminal pins 2. The entire structure is enclosed in the conventional manner in an envelope 13 as shown in Fig. 3.

The valve electrodes are first assembled between the spacers 7 and 8. The leads 11 are then welded to the electrodes. The assembly so formed is then placed upon the sleeve 3 (which has previously been fixed in position by welding the lug 5 to the corresponding terminal pin 2) and the eyelets in the spacer 7 are engaged and fixed. Each of the leads 11 is at the same time threaded through the corresponding slot 12 and is then welded to the corresponding terminal pin 2. The glass header 1 may then be sealed to the end of the envelope bulb in the usual way.

The sleeve 3 acts as a screen between the various electrode connections, and if desired it may be shaped to provide radially extending or re-entrant parts extending between the termi-

nal pins 2 to improve the screening, or fins 14, or the like may be fixed to the sleeve so as to project between the terminal pins as shown in Fig. 4.

It will be seen that this arrangement avoids the necessity for bending the terminal pins 2 in order to make contact with the valve electrodes, and that the electrode assembly is firmly supported from the glass base 1 independently of any wires or leads which have any electrical function to perform. The terminal pins can be plain cylindrical wires not specially formed in any way or having portions reduced in diameter. The shielding provided by the sleeve is definite and reproducible in manufacture. The spacings between the electrodes and metal parts are fixed and capacities are uniform.

The arrangement is also adaptable to a valve having a metal header through which the terminal pins are sealed by means of glass beads and may be equally adaptable to a valve with a metal envelope. The sleeve could in this case be welded or otherwise secured to the base at some early stage in the manufacture, for example, before the terminal pins are sealed through the header; or the base and sleeve might be formed in one piece.

What is claimed is:

1. An electron discharge device comprising a substantially flat header, a plurality of straight terminal pins mounted in a circle and sealed perpendicularly therethrough, a tubular metal support member resting upon the said header inside the said circle and secured to one of the said terminal pins out of contact with the other pins, an assembly of electrodes insulated from and mounted on the said support member, a wire connecting each of the said electrodes with a corresponding one of the said terminal pins, and an envelope bulb sealed to the said header and enclosing the said support member and assembly.

2. An electron discharge device comprising an envelope bulb, a disc shaped header closing one end of said bulb, lead-in conductors mounted in a circle and sealed in said header, a tubular support member coaxial with said bulb, one end of said member being seated on said header inside said circle of conductors, an assembly of electrodes seated on the opposite end of the support member, the electrodes of the assembly being connected to the lead-in conductors.

3. An electron discharge device comprising an envelope closed with a disc-like header, lead-in conductors sealed in a circle through said header, a tubular support member inside said circle with one end seated on said header; an electrode assembly comprising two spaced parallel insulating spacers and electrodes mounted between said spacers, one of said spacers being seated on and attached to the other end of said support member, connectors through openings in the side of said support member connecting said electrodes to said lead-in conductors.

4. An electron discharge device comprising a substantially flat header, a plurality of straight terminal pins mounted in a circle and sealed perpendicularly therethrough, a tubular metal support member resting upon the said header inside the said circle and secured to one of the said terminal pins out of contact with the other pins, said support member having an outwardly extending flange at the end which rests upon the header, an assembly of electrodes insulated from and mounted on the said support member, conductors connecting each of said electrodes with the corresponding one of the said terminal pins, and an envelope bulb enclosing said support member and assembly and sealed to the said header.

5. A device according to claim 4 in which the said support member is provided with a projecting lug on the said flange welded to the said one terminal pin.

6. An electron discharge device comprising a substantially flat header, a plurality of straight terminal pins mounted in a circle and sealed perpendicularly therethrough, a tubular metal support member resting upon the said header inside the said circle and secured to one of the said terminal pins out of contact with the other pins, said support member having a plurality of outwardly extending lugs at the end remote from the header, an assembly of electrodes insulated from and mounted on the said support member, said assembly being fixed to said lugs, conductors connecting each of said electrodes with the corresponding one of the said terminal pins, and an envelope bulb enclosing said support member and assembly and sealed to the said header.

7. An electron discharge device comprising a substantially flat header, a plurality of straight terminal pins mounted in a circle and sealed perpendicularly therethrough, a tubular metal support member resting upon the said header inside the said circle and secured to one of the said terminal pins out of contact with the other pins, an assembly of electrodes insulated from and mounted on the said support member, conductors connecting each of said electrodes with the corresponding one of the said terminal pins, said support member having longitudinal slots to allow for the passage therethrough of the said connecting conductors, and an envelope bulb enclosing said support member and assembly and sealed to the said header.

8. An electron discharge device comprising a substantially flat header, a plurality of straight terminal pins mounted in a circle and sealed perpendicularly therethrough, a tubular metal support member resting upon the said header inside the said circle and secured to one of the said terminal pins out of contact with the other pins, said support member having fins extending between pairs of adjacent terminal pins, an assembly of electrodes insulated from and mounted on the said support member, conductors connecting each of said electrodes with the corresponding one of the said terminal pins, an envelope bulb enclosing said support member and assembly and sealed to the said header.

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